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I. INTRODUCTION TO 2148 ARTIST BOARD

ARM7 LPC2148 is a 16/32 bit ARM7TDMI-S Core Microcontroller from Philips (NXP). LPC2148 includes built in peripherals such as USB, ADC, DAC, Timer/Counter, PWM, Capture, RTC, I2C, SPI, UART etc.

The **LPC2148 ARTIST Board** has an important peripheral interface assembled for evaluation and testing.

The functional details of the board are as follows:

- 16/32 Bit ARM7TDMI-S MCU No.LPC2148 from Philips (NXP)
- Has RS232 Communication Circuit for 2 Channels (UART0 and UART1).
- USB device Option.
- Onboard 20 pin JTAG connector for debugging/programming applications.
- Onboard Reset and ISP Switches (Can be programmed via MANUAL & AUTO mode) .
- Has EEPROM interface using I2C.
- 32.768 KHz Clock for RTC. Option for a CMOS Battery.
- On Board Buzzer and Relay.
- Onboard 7 Segment displays via I2C.
- Analog input via AD0.1
- I/O pin out for different interfaces.
- Onboard 16*2 LCD.
- On Board Graphical LCD
- On Board 4x4 matrix keypad
- On Board Temperature Sensor connected to AD0.2.
- On Board Power Supply Circuit for +5V and +3.3V (USB or external power Source input options)
- On Board 12 MHz Oscillator.
- LED for Power Supply, USB.
- Power Supply – DC input 7.5 - 9V/ 500mA - 1A.

II. HANDLING WARNINGS

- ✓ The Kit must not be subjected to high electrostatic potentials.
- ✓ General practice for working with static sensitive devices should be followed when working with the LPC2148 ARTIST Board.
- ✓ Board must always be handled at properly designated work areas.
- ✓ When not being worked on, the board must be enclosed in the box and stored safely.
- ✓ Avoid touching the circuits or components.
- ✓ Stacking of circuit boards and assemblies should be avoided to prevent physical damage.

III. KIT DELIVERABLES

- LPC2148 ARTIST Board.
- USB Cable.
- CD that contains, KEIL evaluation version installer, Flash Magic Installer, H JTAG installer schematics, user manual and related documents, hex files for various peripherals, Keil project and workspace for implementing peripherals and few example project codes.

IV. BOARD USE REQUIREMENTS

To test and evaluate the board, we recommend the following configurations

- PC with 2.0 GHz or higher CPU, 512 MB or above RAM, USB Port, Serial Port. (Will need a Parallel Port if a Parallel JTAG is being used)
- Operating System (We recommend Windows XP, since most of our testing is done on same platform, although other OS can also be used)
- Integrated Development Environment (We recommend Keil uVision4. Other compatible IDE can be used).
- Debugging/Programming Tool (We recommend HJTAG if Parallel Port JTAG is used, CoiNel ARM USB JTAG has been checked on Rowley Crossworks).

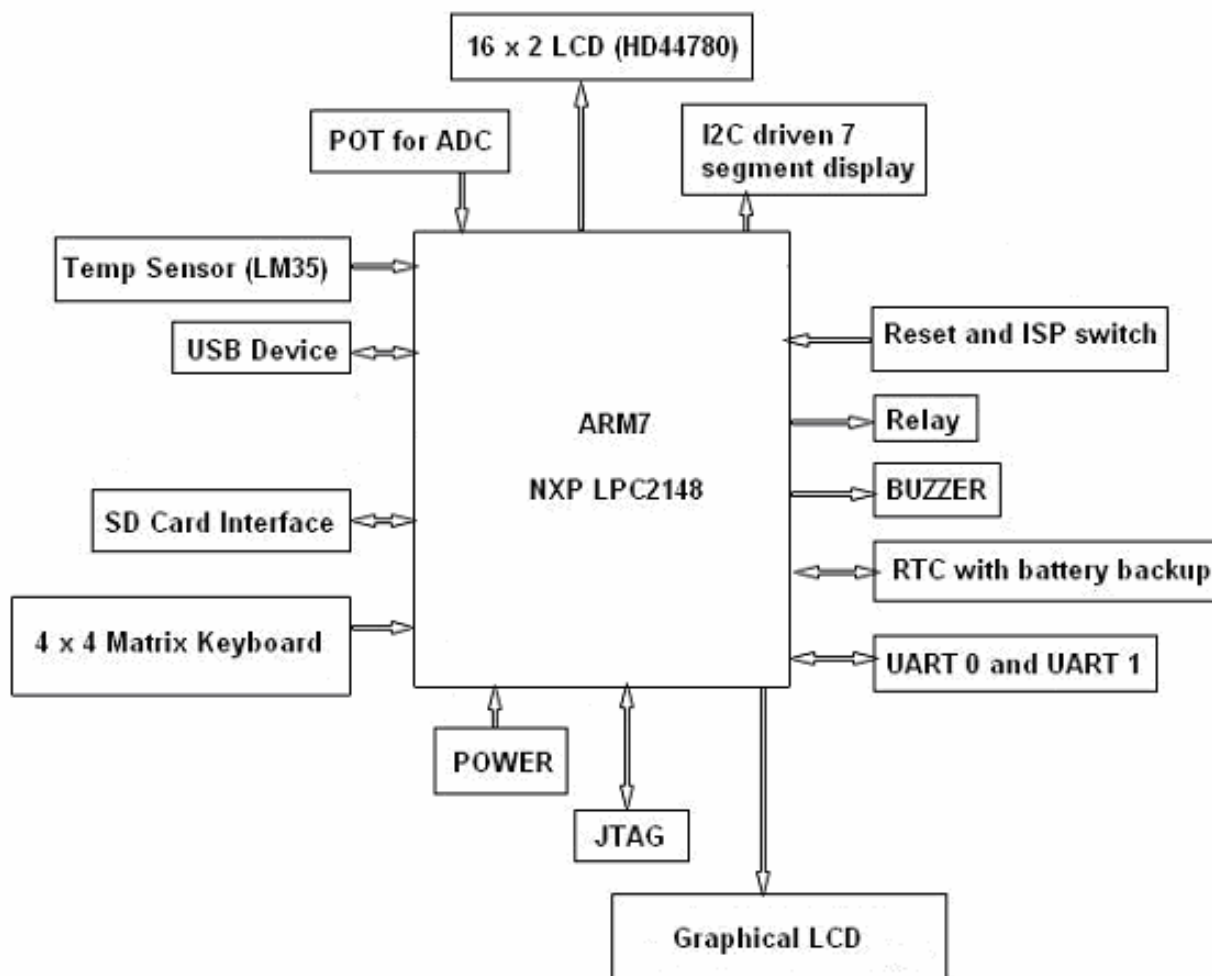
Known Issue: CoiNel ARM USB JTAG does not work for LPC2148 on Kiel UVision4

- To test all the features of the board, you would also require a USB Cable (A to B), Speakers or Headphones, PS2 Keyboard, Serial cable and DC power adapter (7.5V-9V/1Amp DC).

The board can also be powered by USB and hence use of DC power adapter is not always required.

- 4x4 matrix keyboard and graphical LCD can also be tested. These boards are sold separately and can be purchased at www.coineltech.com/shop/

V. FUNCTIONAL BLOCK DIAGRAM OF LPC2148 ARTIST BOARD



VII. BOARD LAYOUT

To Be added.

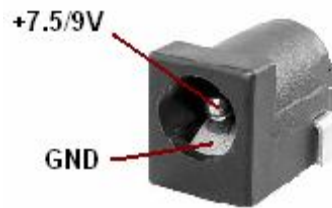
www.coineltech.com

VIII. IO CONNECTOR DESCRIPTION

The details of the IO connections are as follows

1. DC Power Input

The Power supply to be used has to be 7.5V to 9V DC, 1Amp. The DC jack connectivity details are shown in the figure.

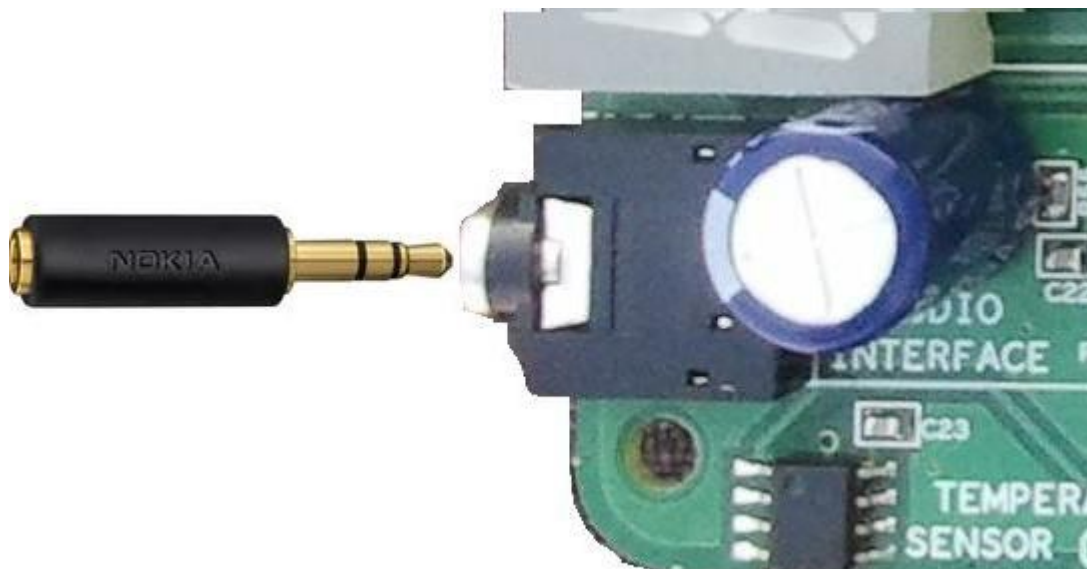


A slide switch is provided for power ON/OFF control. The slide switch is useful only when an external DC adapter is used. When USB is used to power the board, the switch condition will not have any effect on the power input.

When using the adapter, sliding the switch shown in figure will turn the board ON.

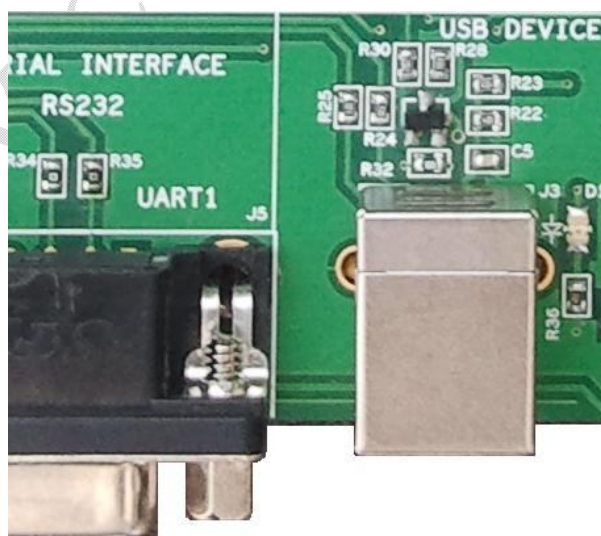


2. Audio jack



Audio jack is provided for plug & play audio.

3. USB connections



The USB provided can be used as an End Device.

4. Reset and ISP Switch

The reset switch can be used for resetting the CPU and ISP (In system programming) switch will be used during external interrupt/programming. The details of programming LPC2148 in ISP mode is given in detail in programming section.



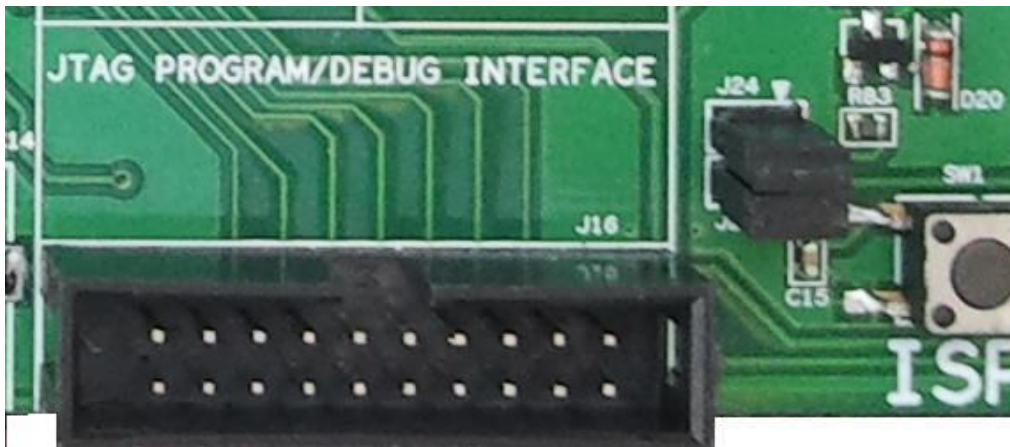
5. Analog Input



The POT is connected to AD0.1

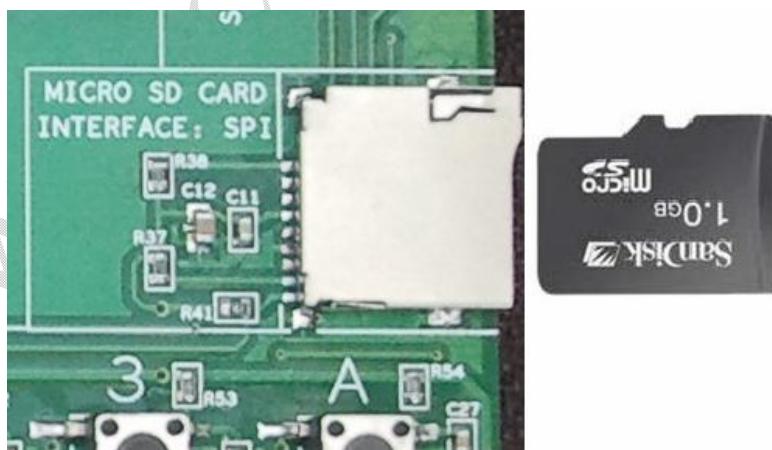
6. JTAG 20 Pin Box Header

The box header will be used to connect the JTAG for Debug/Programming. A 20 Pin IO Cable can be connected here which connects from a Parallel/USB JTAG. You can buy the Parallel or USB JTAG at <http://www.coineltech.com/shop>



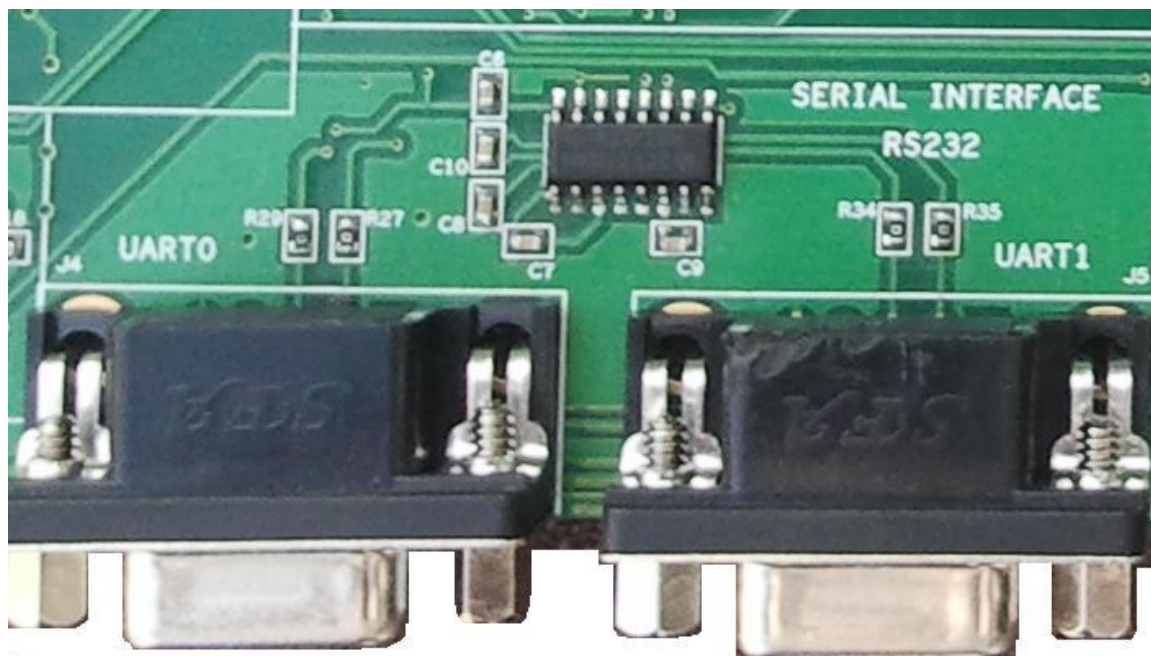
7. Micro SD Card Connector

The correct way of inserting the SD card is given below. Pressing the card in the direction shown will lock the card. Make sure the card is properly inserted.



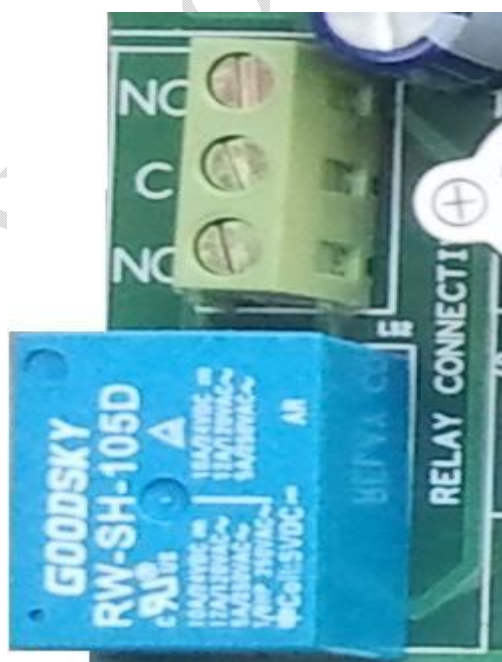
Note: To remove the card, press the card gently in the same direction shown above and then letting it loose. The card will easily pop out and can be removed.

8. RS232 Serial Interface

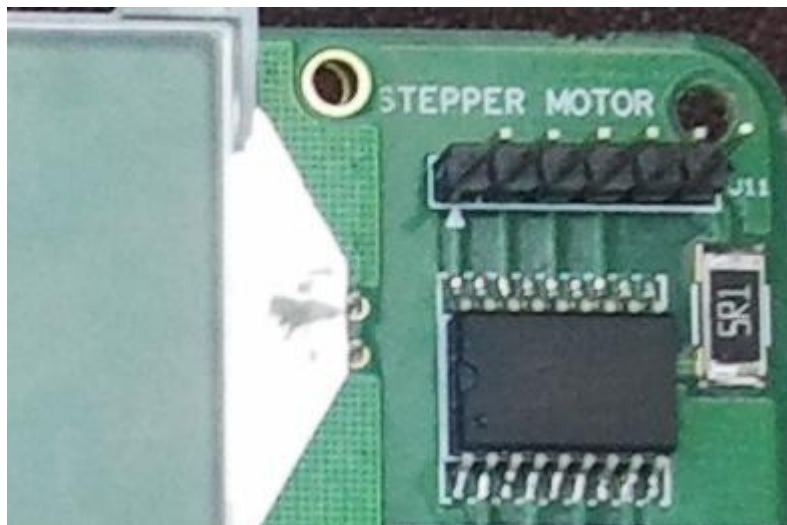


Programming can be done using nine core RS232 cable.

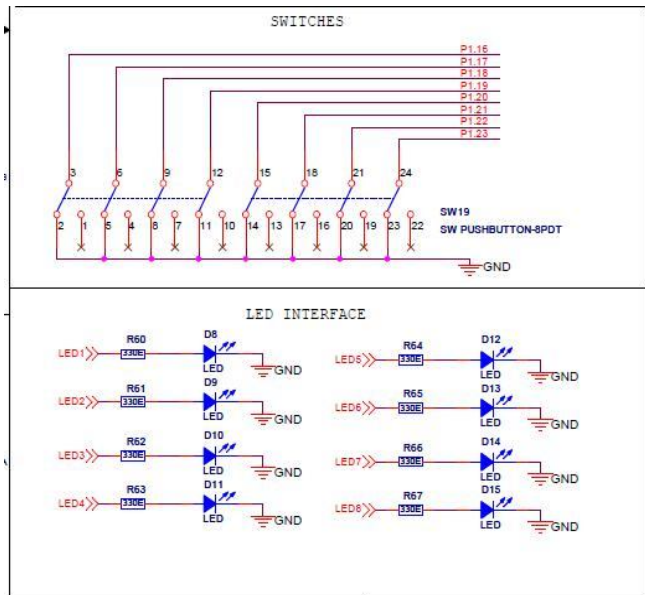
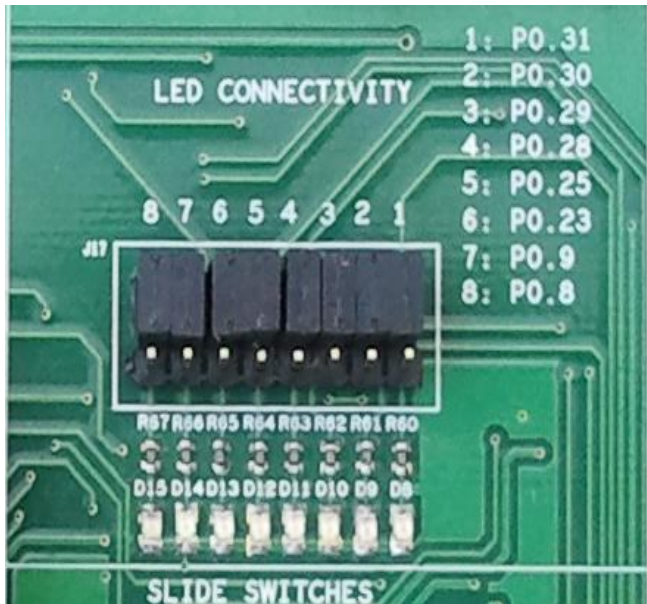
9. Relay Connectivity



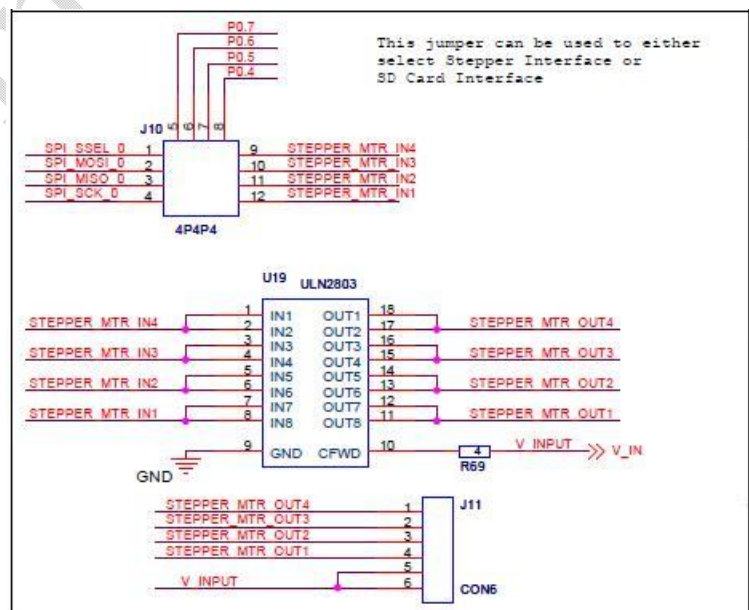
10. Stepper Motor Connectivity

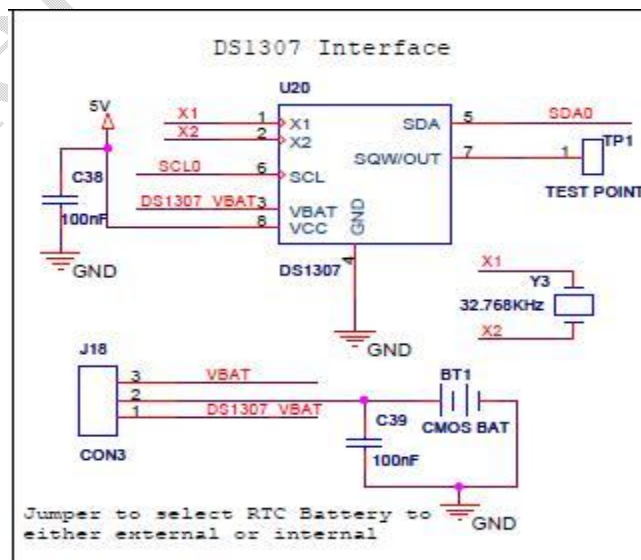
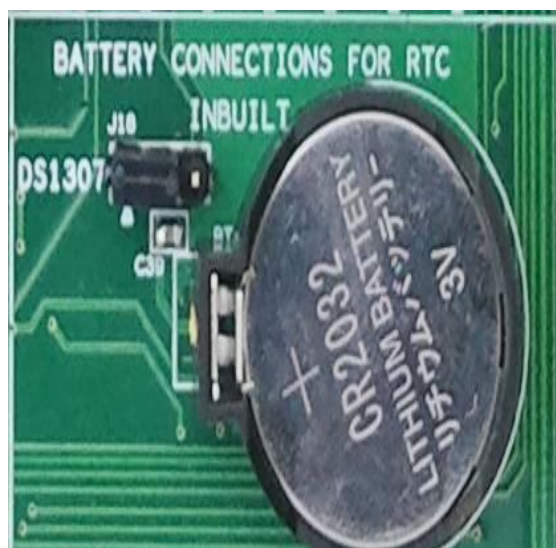
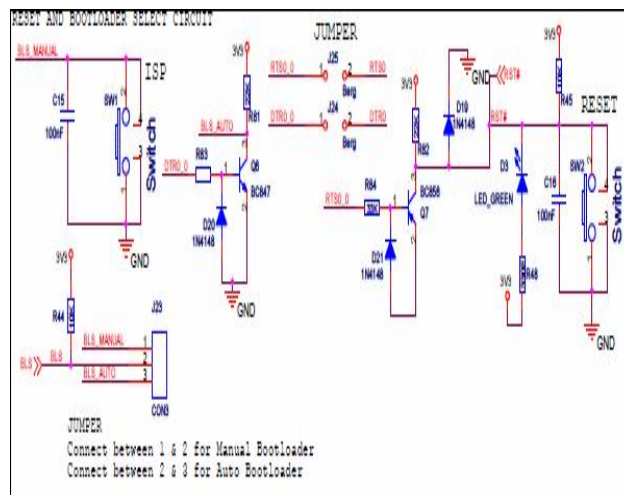
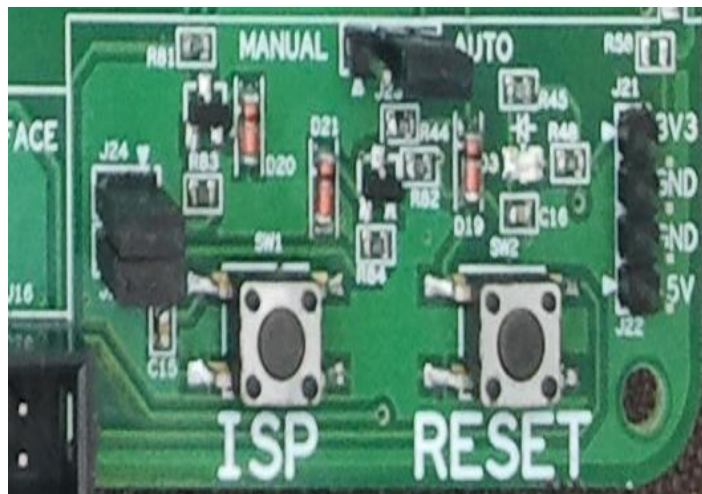


3. LED/Slide Switches Jumper Selection



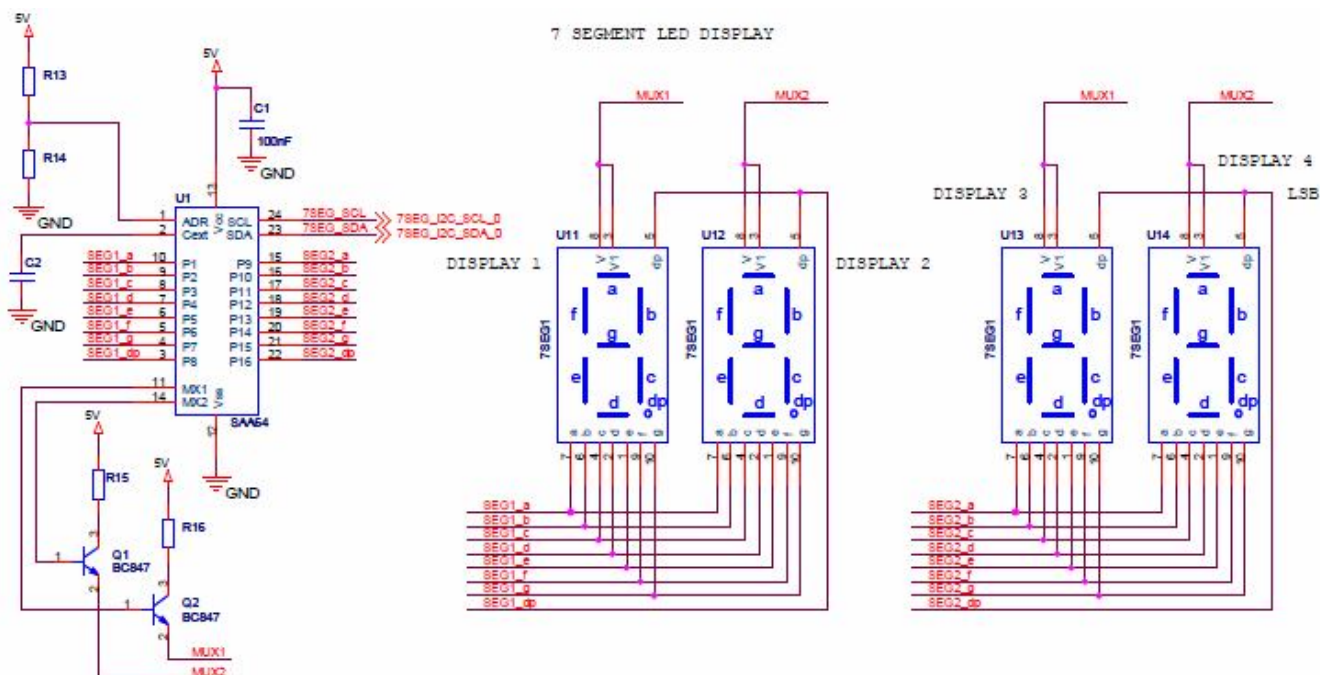
4. Stepper motor/SD Card Jumper Selection





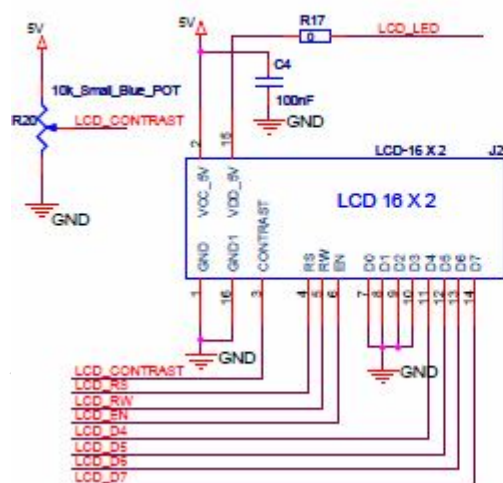
X. SCHEMATICS

1. 7 Segment LED Display

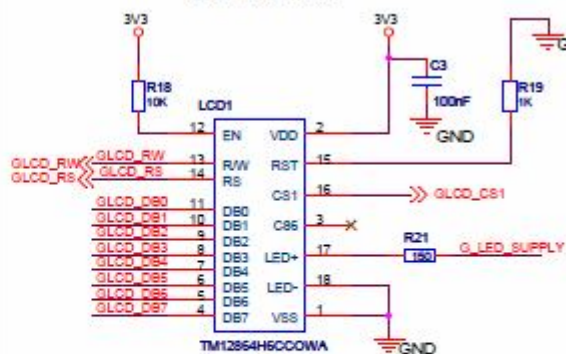


2. 16x2 And Graphical Display

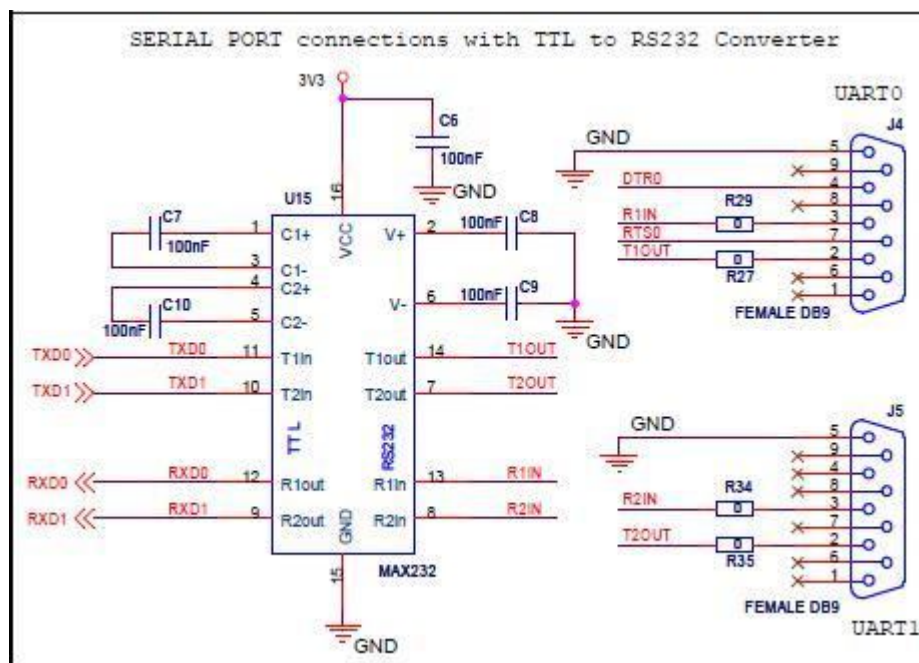
16 x 2 HD44780 BASED ALPHANUMERIC DISPLAY



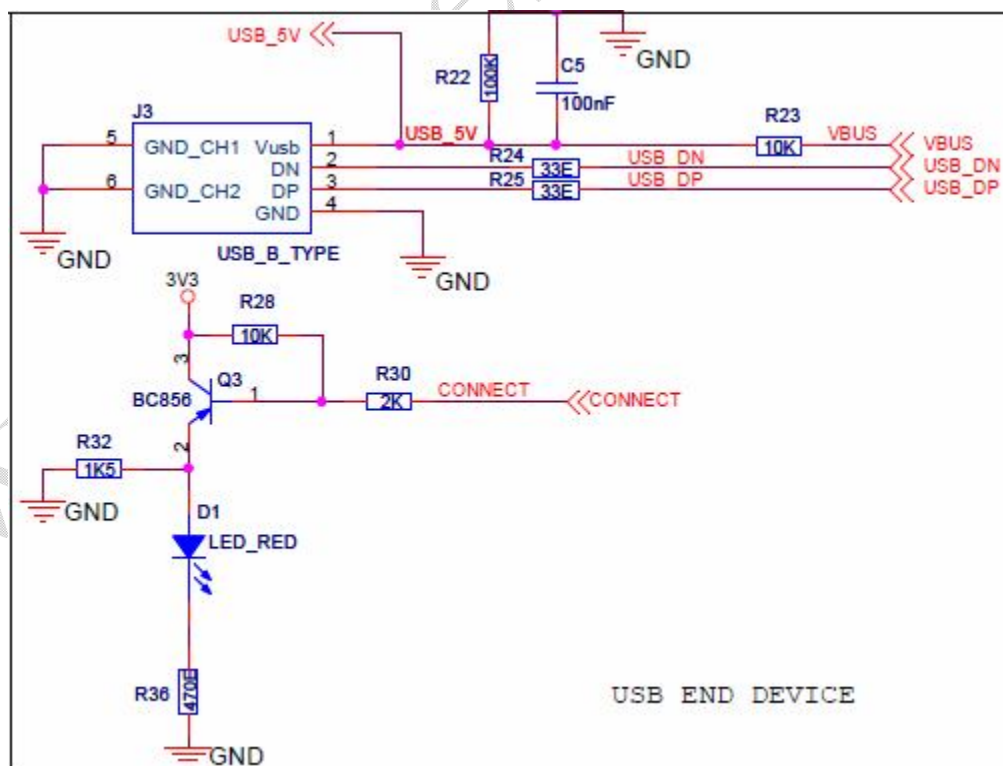
GRAPHICAL LCD



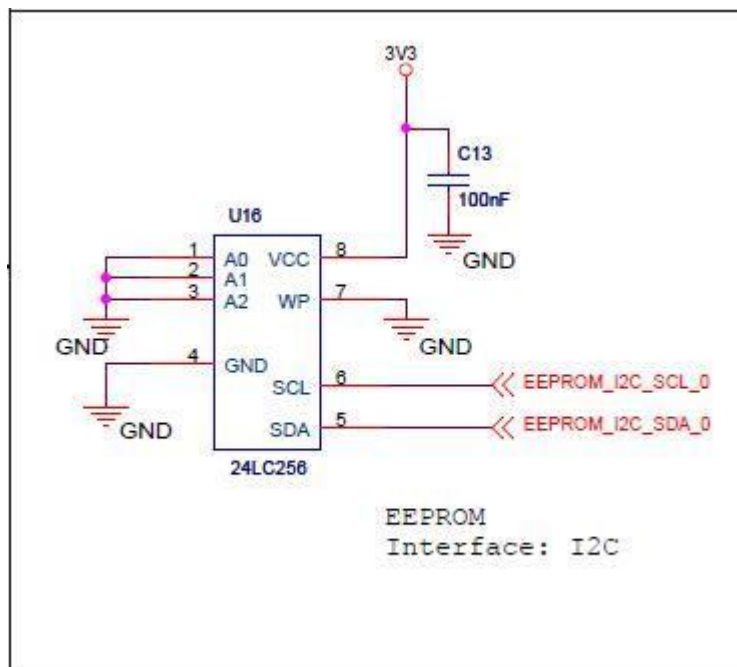
3. Serial Port Connections



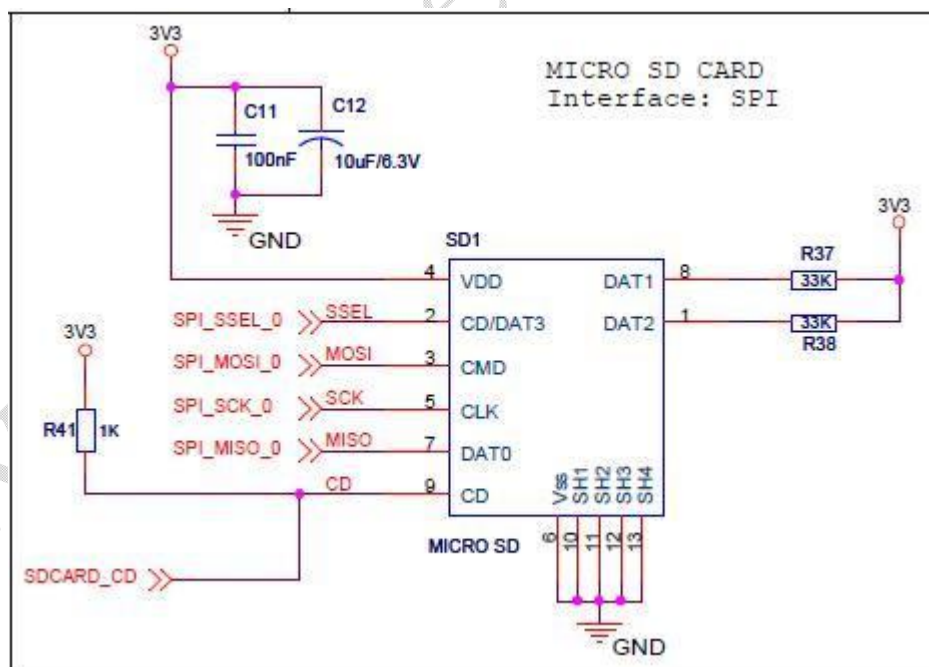
4. USB End Device



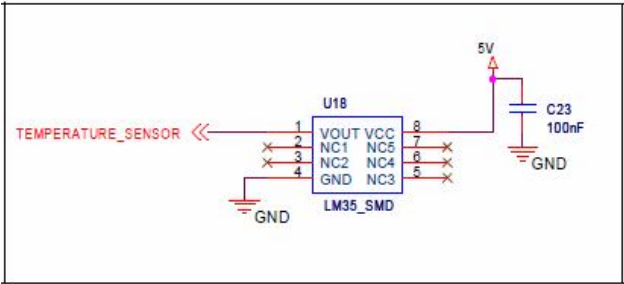
5. EEPROM Interface via I2C



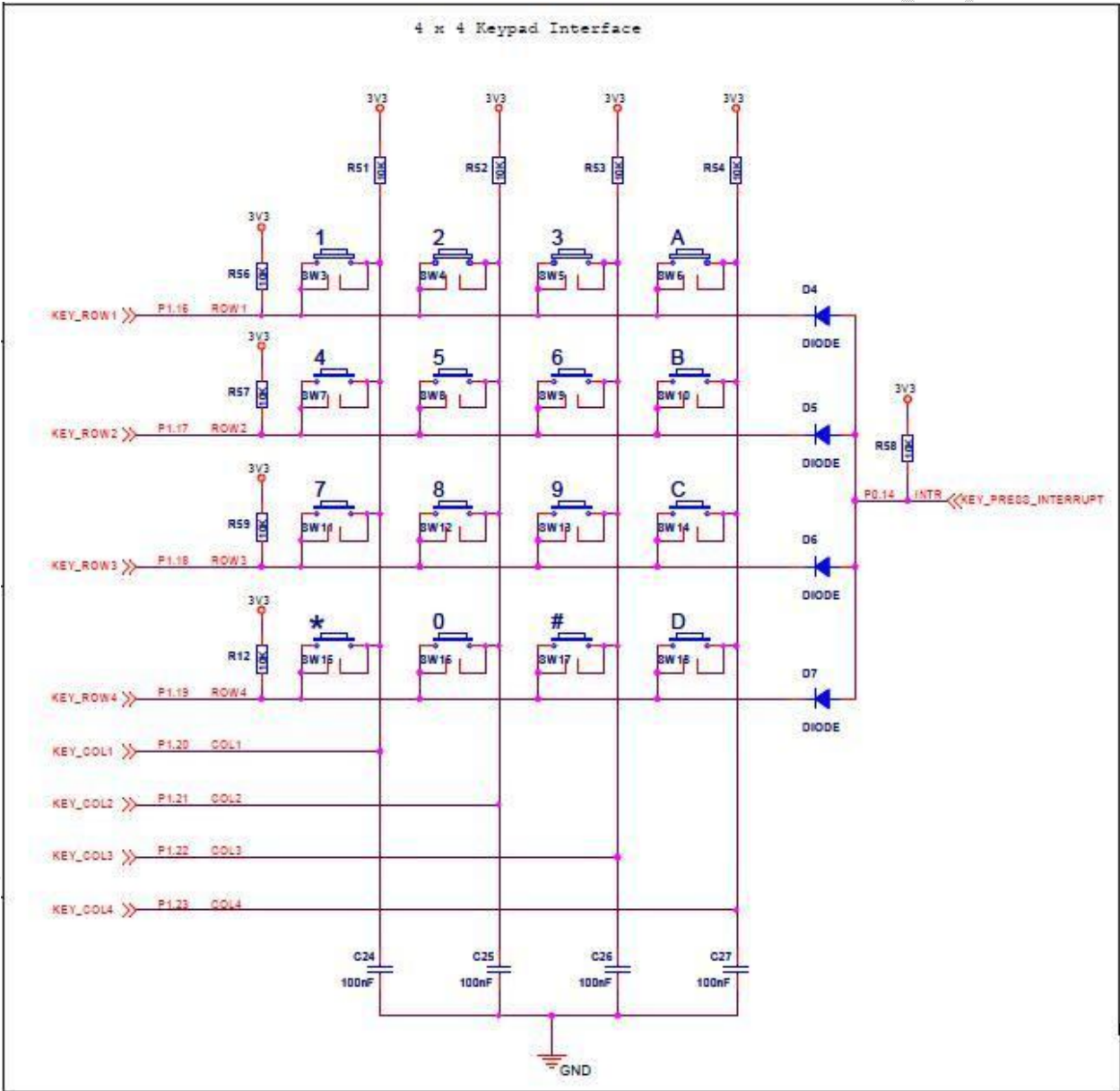
6. Micro SD Card via SPI



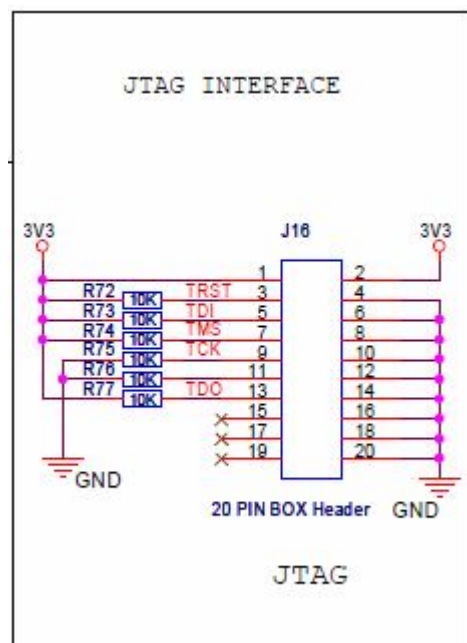
11. Temperature Sensor



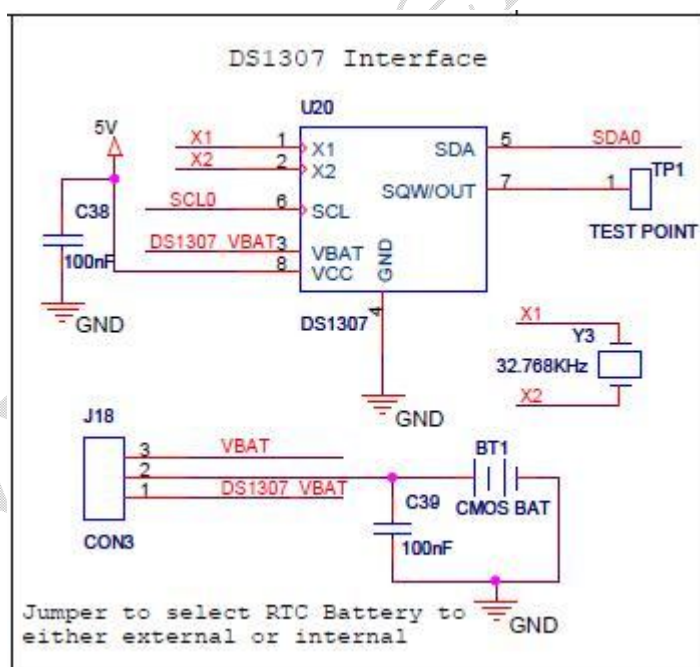
12. 4x4 Keypad Interface



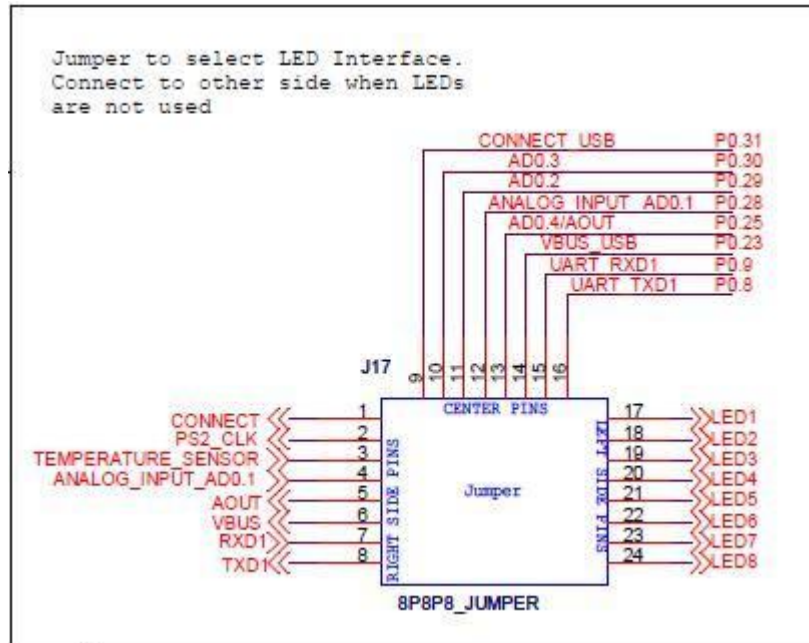
13. JTAG Interface



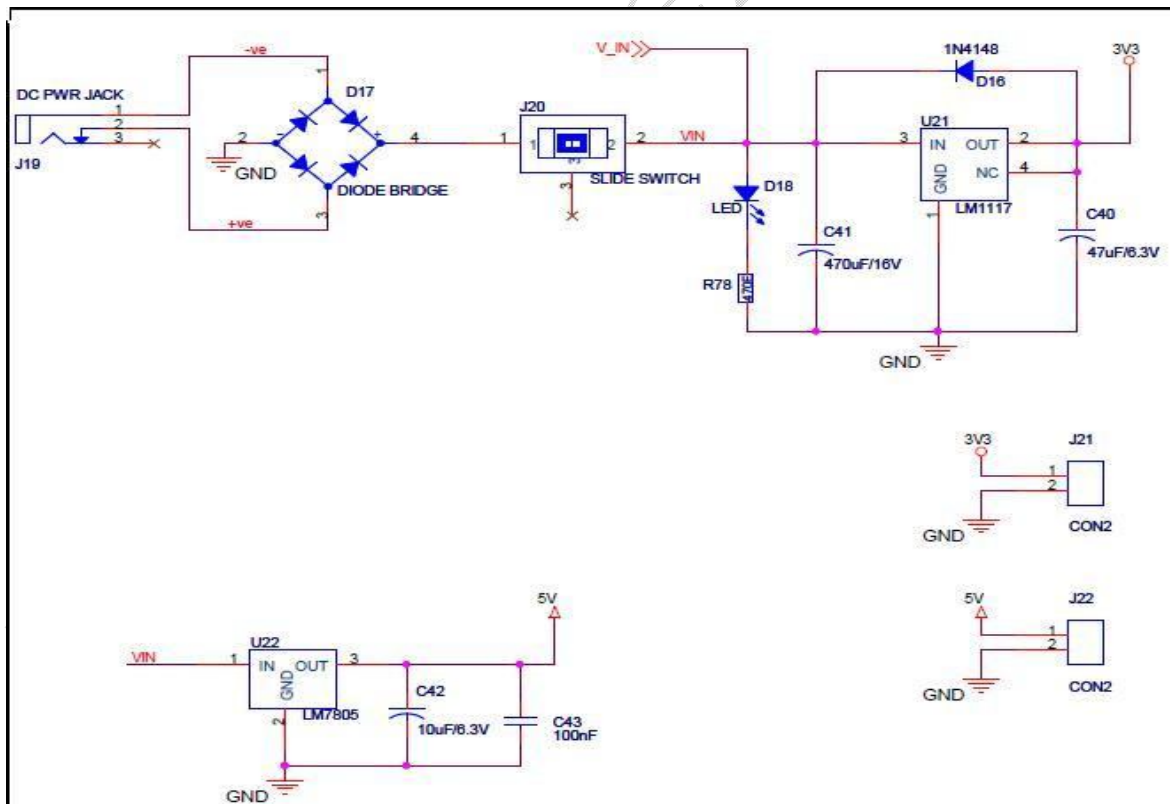
14. DS1307 Interface



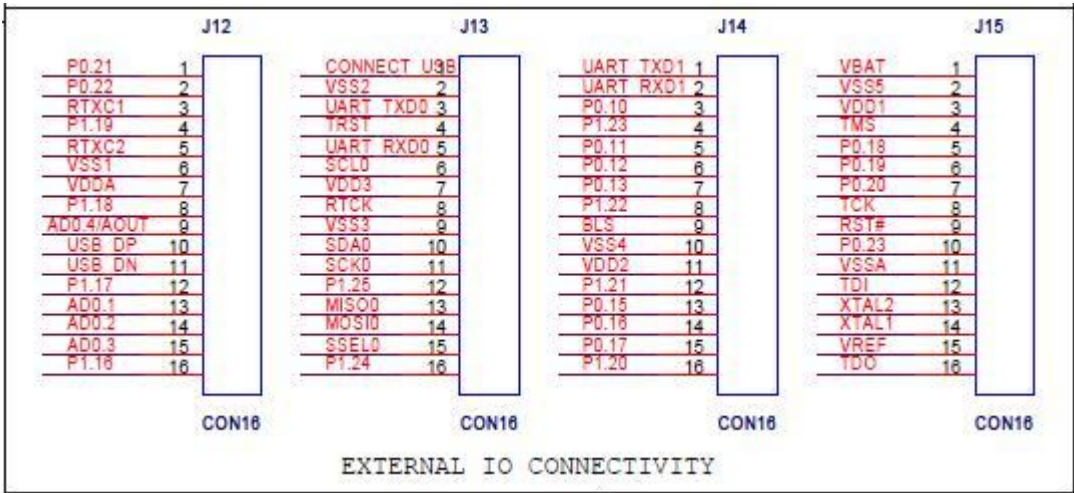
15. Jumper to select LED interface



16. DC Power Jack



17.External IO Connectivity



X. Steps to Download Hex File through serial port

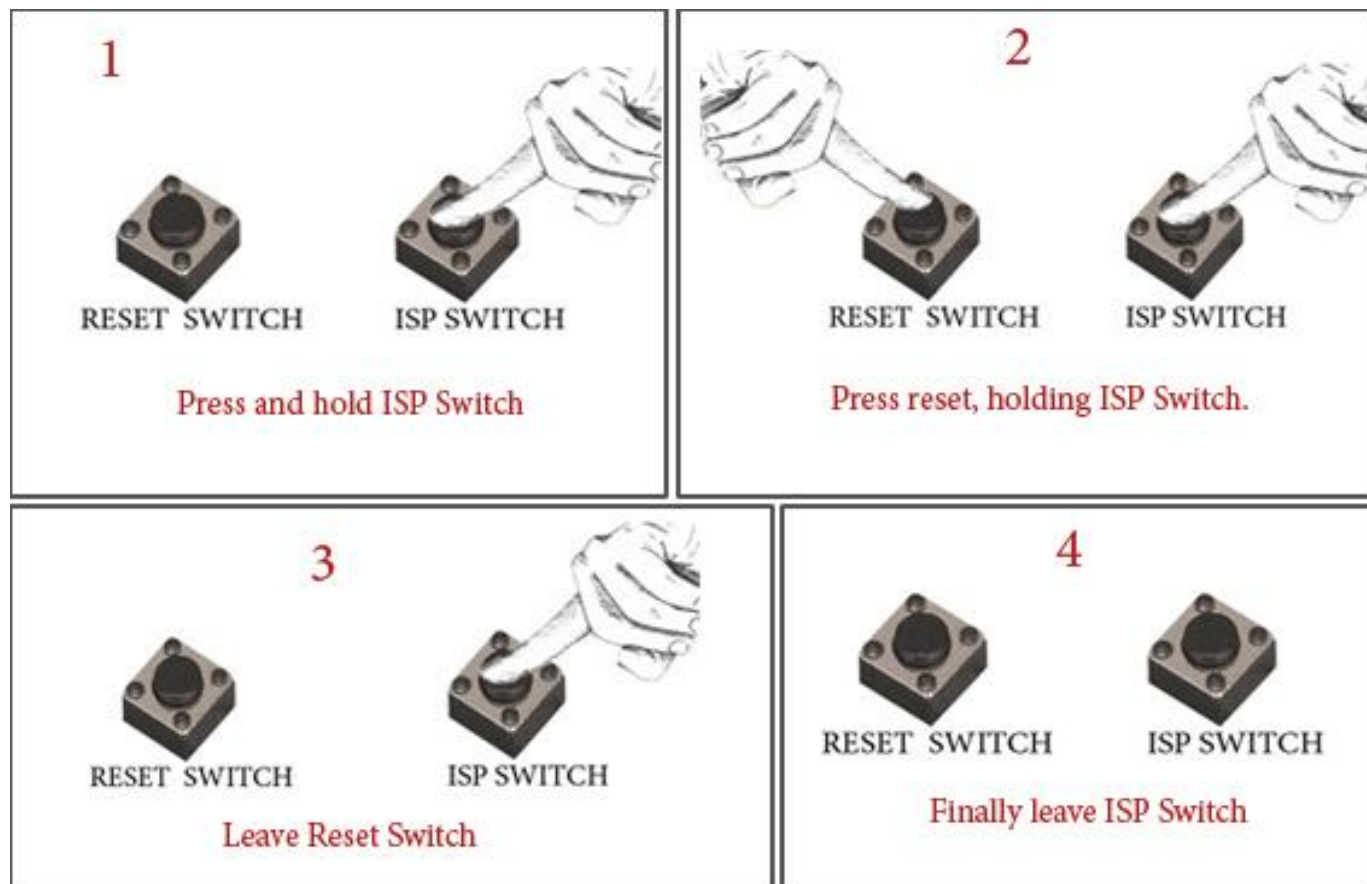
You can download the hex file in Manual mode or Auto mode

XII.I Manual ISP Programming

You need to have LPC2148 ARTIST Board, Serial cable (3 core or 9 core), Desktop PC, Flash Magic Software.

Follow the Steps is below:

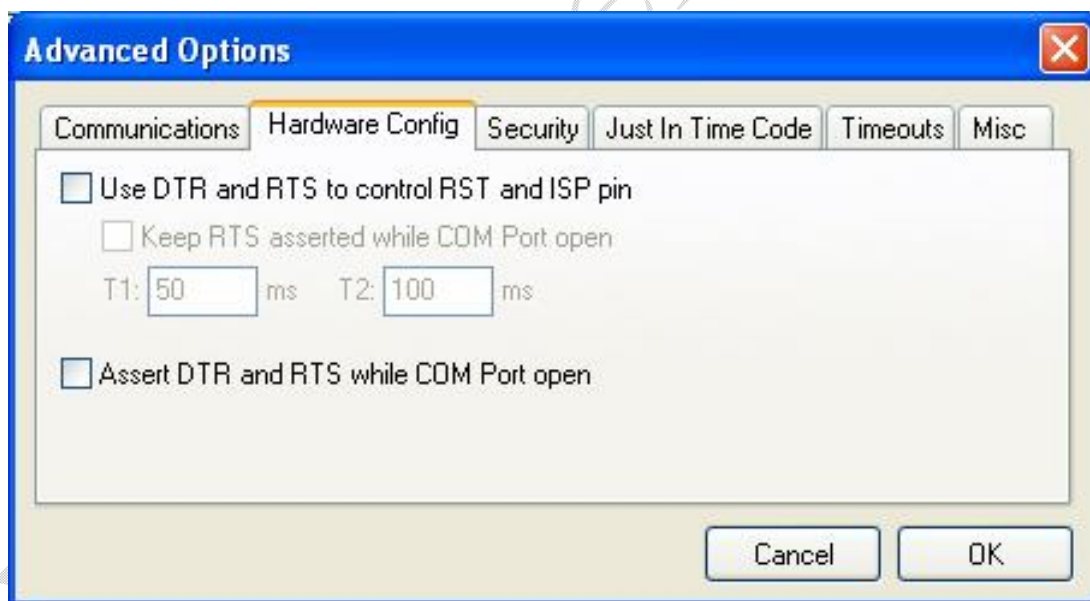
- Power ON LPC2148 DEV Board.
- Connect Serial Cable Between UART0 of LPC2148 ARTIST Board and PC.
- Make sure jumper (J23) is connected towards Manual Mode.
- Make sure jumper (J24 and J25) is removed.
- Enter into the ISP Programming mode by following procedure.



- Open Flash Magic Software in PC.
- Click on Options and select Advance Options.

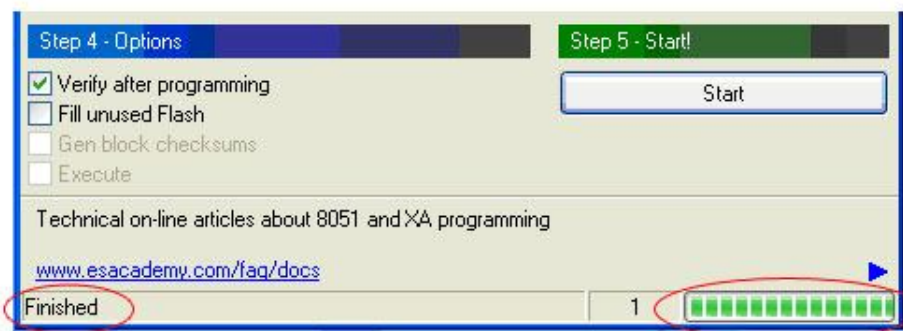
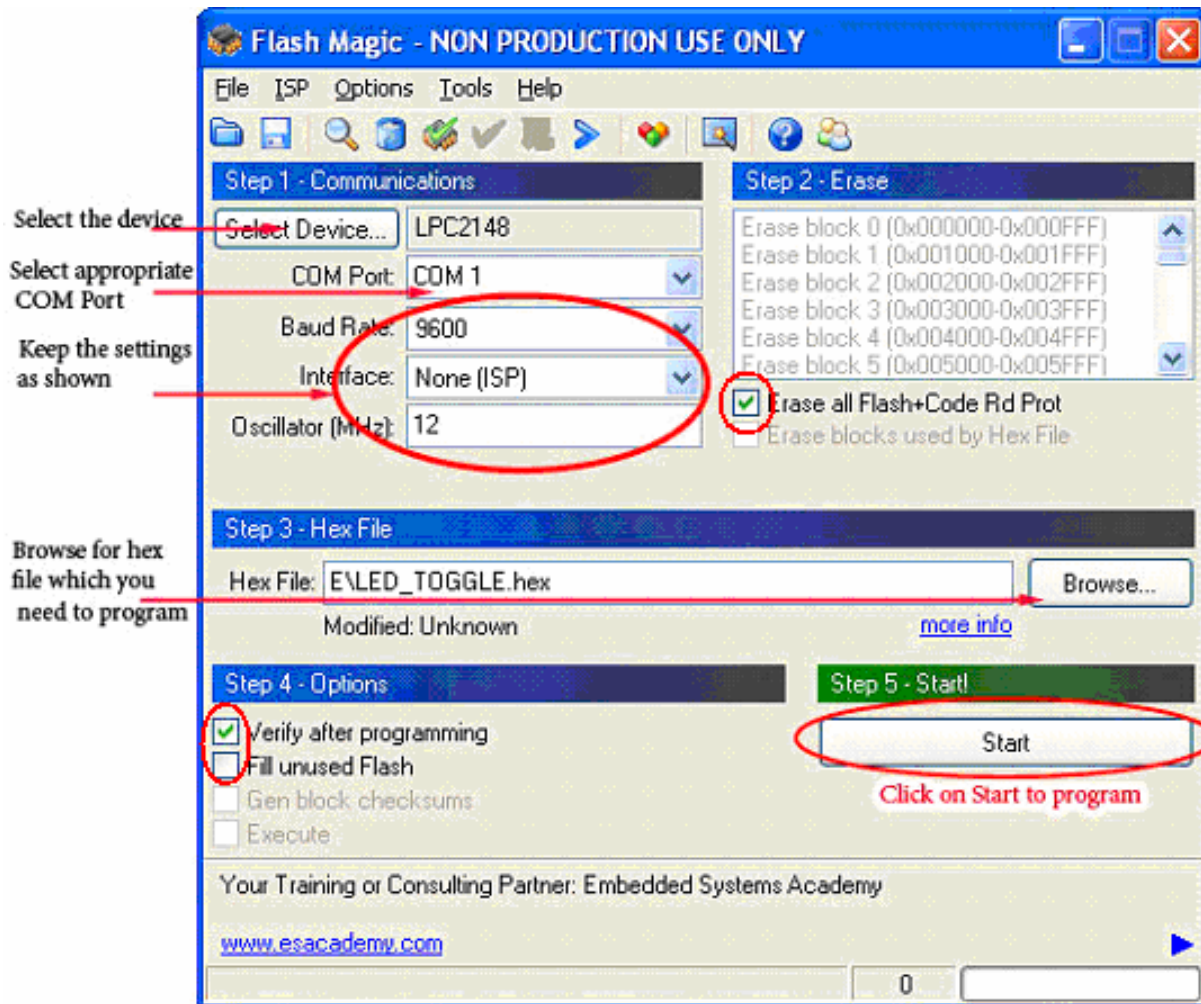


- In Advance Options, make sure Use DTR and Assert DTR are unchecked.



- Click on OK after making changes if required.

- Keep the Settings as below in Flash Magic and Click on Start to program.
- COM Port may not be COM1 in every PC, Check it in **Ports (COM & LPT)** in **Device Manager**. Make sure you have connected to the proper COM port that is selected.



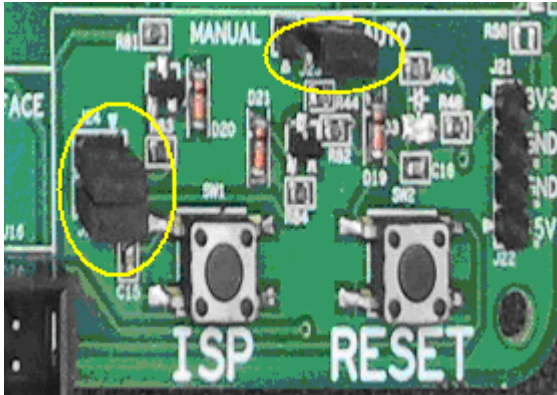
- If All the Settings are proper, the programming will be successful.

XII.II. AUTO Programming

You need to have LPC2148 ARTIST Board, Serial cable (9 core), Desktop PC, Flash Magic Software.

Follow the Steps is below:

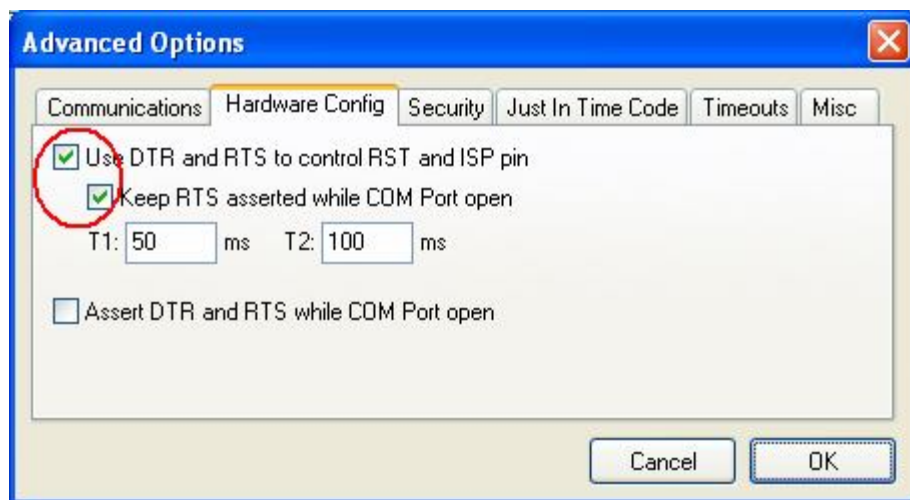
- Connect full Serial Cable (9 Core) Between UART0 of LPC2148 DEV Board and PC Serial Port.
- Make sure jumper (J23) is connected towards Auto Mode.
- Make sure jumper (J24 and J25) is connected as shown.



- Power ON LPC2148 DEV Board.
- Open Flash Magic Software in PC.
- Click on Options and select Advance Options.

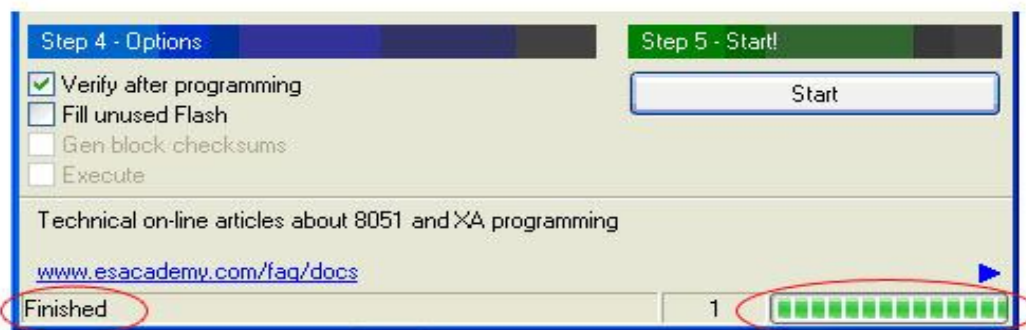
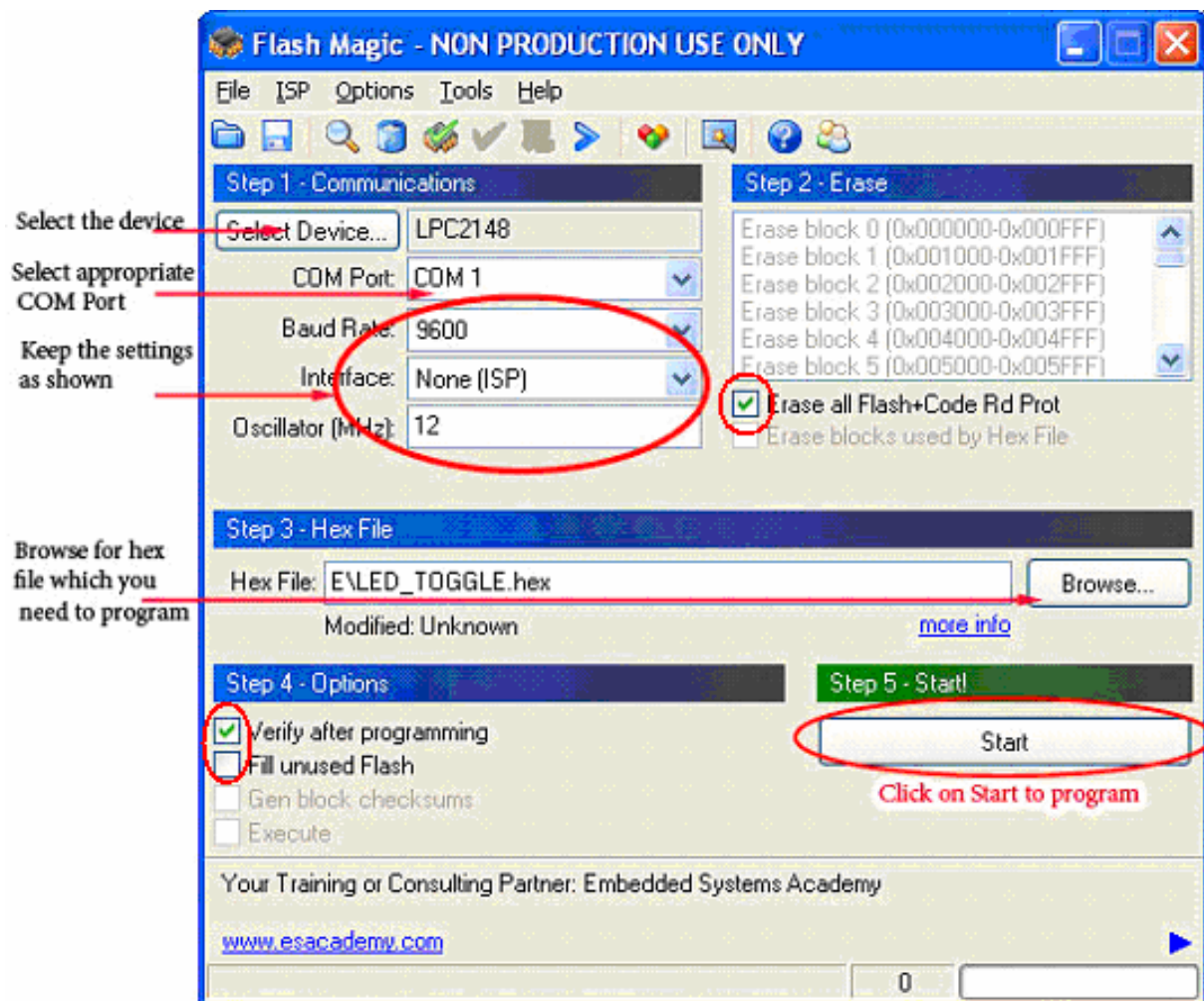


- In Advance Options Keep the Settings as shown below.



Click ok to save settings and go back to Flash Magic main page option.

Keep the settings as below in Flash Magic. After browsing the appropriate file to be loaded, click start.



- If All the Settings are proper, the programming will be successful.

Important Note:

- You need to remove jumper (J24 and J25) so that the code loaded starts executing.
- If required, you can also reset the board.

CLARIFICATIONS AND SUPPORT

CoiNel is at your service. If you have any clarifications or suggestions on this document or need any technical support and consultation, we are available in forms of telephone and E-mail.

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